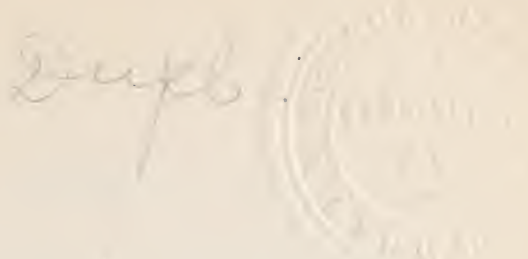


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# Maine Agricultural Experiment Station

BULLETIN No. 55.

NOVEMBER, 1899.

## CEREAL BREAKFAST FOODS.

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This Bulletin contains the analyses of samples of Cereal Breakfast Foods found in the Bangor market, together with a discussion of their nutritive values and cost.

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Orono, Maine.

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## CEREAL BREAKFAST FOODS.

CHAS. D. WOODS and L. H. MERRILL.

The general use, at the present time, of cereals on the breakfast table is largely due to the improved condition in which these goods are now offered. Twenty years ago uncooked decorticated oats, (sold under the name of oat meal), graham flour, corn meal, and hominy, all of which required long cooking, made up nearly the entire list of breakfast cereals available to the average housekeeper. Today it is possible to purchase at a moderate price cereal foods which have been previously thoroughly cooked, and subsequently dried so that they will keep indefinitely. These are ready for the table without further cooking or, if wanted hot, can be prepared in a few minutes' time. The process of manufacture is hygienic and cleanly and will bear the closest inspection. Starting from the elevator the goods are cleaned, milled, cooked, evaporated, and packed by machinery. It is very gratifying to find that this class of goods is free from adulteration and careless preparation. The processes differ in different factories and many of them are covered by patents. Some goods may be better prepared than others, just as one flour is better than another; but there is no preparation on the market so far as the writers know, but what is better prepared than anything known to the generation which preceded us.

The tables on pages 94 and 95 contain the description of the samples, including name of goods, name of the maker, place of purchase, the price paid, the weight of the package contents, and the cost per pound. The goods were, with one exception, purchased in Bangor the same day. It was found that the prices at different stores were practically the same for the same goods.

The table on page 96 gives the analyses of these foods calculated to dry matter. The determinations were made by the usual methods, and the heats of combustion were determined by means of the Atwater bomb calorimeter. The fuel value is here given per gram.

The table on page 97 gives the results of the table on page 96 calculated to water content at time of the purchase of the materials. Fuel values as here given are calculated per pound instead of per gram as in the preceding table.

## CEREAL FOODS.

Laboratory number.	Name.	Manufacturer.
<b>CORN PREPARATIONS.</b>		
6230	Crown Flakes.....	Crown Cereal Company .....
6231	Hecker's Hominy .....	Hecker, Jones-Jewell Milling Co..
6232	H-O Company's New Process Hominy.....	The H-O Company .....
6233	Mazama .....	Mazama Health Food Company...
<b>UNCOOKED OAT MEALS.</b>		
6234	A Oat Meal.....	American Cereal Company.....
6235	C Oat Meal .....	American Cereal Company.....
6245	McCann's Finest Oat Meal.....	John McCann.....
<b>COOKED OAT PREPARATIONS.</b>		
6242	Hecker's Oat Meal .....	.....
6244	Hornby's H-O Oat Meal .....	The H-O Company .....
6236	American Cereal Company's Rolled Oats .....	American Cereal Company .....
6237	American Cereal Company's Rolled Oats..	American Cereal Company .....
6338	Buckeye Rolled Oats.....	American Cereal Company .....
6239	Buckeye Rolled Oats.....	American Cereal Company .....
6241	Echo White Rolled Oats .....	Steward & Merriam.....
6243	Hecker's Rolled White Oats.....	Hecker, Jones-Jewell Milling Co..
6240	Peoria Rolled Oats.....	Steward & Merriam.....
6246	Quaker Rolled White Oats .....	American Cereal Company .....
6247	Tip Top Rolled Oats .....	Akron Cereal Company.....
<b>WHEAT PREPARATIONS.</b>		
6264	Fruen's Best Wheat Wafers.....	Fruen Cereal Company.....
6263	Fruen's Rolled Wheat .....	Fruen Cereal Company.....
6254	H-O Company's Breakfast Food.....	The H-O Company .....
6256	Old Grist Mill Rolled Wheat .....	Potter & Wrightington.....
6258	Pettijohn's Breakfast Food.....	American Cereal Company.....
6249	Cream of Wheat.....	Cream of Wheat Company .....
6251	Farinose.....	American Cereal Company .....
6252	Fould's Wheat Germ Meal .....	The Fould's Milling Company.....
6268	Gernea.....	Sperry Flour Company .....
6250	Hecker's Farina .....	.....
6257	Old Plymouth Breakfast Food .....	Old Plymouth Cereal Company...
6259	Pillsbury's Vitos.....	Pillsbury-Washburn Flour Mills...
6260	Ralston Health Club Breakfast Food.....	Robinson-Danforth Company.....
6261	Wheatena .....	Health Food Company .....
6262	Wheatlet .....	The Franklin Mills .....
6265	Shredded Whole Wheat Biscuit.....	The Cereal Machine Company .....
<b>GLUTEN PREPARATIONS.</b>		
6248	Cooked Gluten .....	Health Food Company.....
6253	Dr. Johnson's Glutine .....	Johnson's Educator Food Store...
6269	Whole Wheat Gluten.....	Health Food Company.....
<b>MISCELLANEOUS PREPARATIONS.</b>		
6266	Cook's Flaked Rice.....	American Rice Food & Mfg Co....
6229	Glen Mills Standard Crushed Barley .....	Johnson's Educator Food Store...
6267	Grape Nuts .....	Postum Cereal Company .....
6286	Malt Breakfast Food .....	The Malted Cereal Company.....

CEREAL FOODS, WHERE PURCHASED AND COST.

Laboratory number.	Where purchased.	Price paid per package.	Weight contents of package.		Price paid per pound.
			Grams.	Lbs.	
6230	James H. Snow & Co.....	Cents. 5	400	.88	5.7
6231	Fred T. Hall & Co.....	12	1329	2.93	4.1
6232	J. C. Norton & Co.....	13 (2 for 25)	1324	2.92	4.5
6233	Fred T. Hall & Co.....	15	1136	2.28	6.
6234	Staples & Griffin.....	In bulk.....	.....	.....	4.
6235	Staples & Griffin.....	In bulk.....	.....	.....	4.
6245	Fred T. Hall & Co.....	55	2331	5.14	10.7
6242	Staples & Griffin.....	13 (2 for 25c.)	828	1.83	7.1
6244	Fred T. Hall & Co.....	15	933	2.06	7.3
6236	Staples & Griffin.....	In bulk.....	.....	.....	4.
6237	Fred T. Hall & Co.....	In bulk.....	.....	.....	4.
6238	James H. Snow & Co.....	8 lbs. for 25c in bulk	.....	.....	3.1
6239	T. F. Cassidy & Son.....	10	849	1.87	5.3
6241	J. C. Norton & Co.....	10	895	1.97	5.1
6243	Staples & Griffin.....	10	874	1.93	5.2
6240	J. C. Norton & Co.....	4 cts. per lb., 7 lbs. for 25 cts., in bulk	.....	.....	4.
6246	J. C. Norton & Co.....	13 (2 for 25c.)	851	1.88	6.9
6247	Staples & Griffin.....	5	554	1.22	4.1
6264	J. C. Norton & Co.....	13 (2 for 25c.)	857	1.89	6.9
6263	Staples & Griffin.....	In bulk.....	.....	.....	4.
6254	J. C. Norton & Co.....	10	578	1.27	7.9
6256	Fred T. Hall & Co.....	15	952	2.10	7.1
6258	J. C. Norton & Co.....	13 (2 for 25c.)	841	1.85	7.0
6249	J. C. Norton & Co.....	17	853	1.88	9.0
6251	Fred T. Hall & Co.....	15	936	2.06	7.3
6252	J. C. Norton & Co.....	13 (2 for 25c.)	830	1.83	4.9
6268	J. C. Norton & Co.....	15	795	1.75	8.6
6250	J. C. Norton & Co.....	13 (2 for 25c.)	423	.93	14.0
6257	James H. Snow & Co.....	15	853	1.88	8.0
6259	J. C. Norton & Co.....	13 (2 for 25c.)	951	2.10	6.2
6260	J. C. Norton & Co.....	15	857	1.89	8.0
6261	J. C. Norton & Co.....	25	992	2.19	11.4
6262	J. C. Norton & Co.....	13 (2 for 25c.)	859	1.89	6.9
6265	J. C. Norton & Co.....	13 (2 for 25c.)	398	.88	14.8
6248	Staples & Griffin.....	25	416	.92	27.3
6253	Fred T. Hall & Co.....	25	410	.90	27.7
6269	James H. Snow & Co.....	55 (5 lbs. bag)	2274	5.01	11.
6266	J. C. Norton & Co.....	15	387	.85	17.6
6229	Fred T. Hall & Co.....	15	908	2.00	7.5
6267	J. C. Norton & Co.....	15	428	.94	15.9
6286	A. A. Gilbert.....	15	675	1.49	10.1

PERCENTAGE COMPOSITION OF CEREAL FOODS CALCULATED TO  
WATER-FREE BASIS.

Laboratory number.	Name of Cereal Food.	Protein.	Fat.	Carbo- hydrates.	Ash.	Fuel value per gram.
<b>CORN PREPARATIONS.</b>						
6230	Crown Flakes.....	9.23	.98	89.32	.47	4.359
6231	Hecker's Hominy.....	9.70	.67	89.17	.46	4.287
6232	H-O Company's New Process Hominy.....	9.09	.59	89.99	.33	4.321
6233	Mazama.....	9.66	1.10	88.67	.57	4.368
<b>UNCOOKED OAT MEALS.</b>						
6234	A Oat Meal.....	18.76	8.27	70.18	2.79	4.789
6235	C Oat Meal.....	15.47	8.03	74.46	2.04	4.730
6245	McCann's Finest Oat Meal.....	13.18	10.59	74.27	1.96	4.773
<b>COOKED OAT PREPARATIONS.</b>						
6242	Hecker's Oat Meal.....	20.77	8.11	69.01	2.11	4.829
6244	Hornby's H-O Oat Meal.....	14.75	8.86	74.30	2.09	4.733
6236	American Cereal Company's Rolled Oats...	15.04	8.28	74.44	2.24	4.723
6237	American Cereal Company's Rolled Oats...	16.39	8.11	73.38	2.12	4.661
6238	Buckeye Rolled Oats (in bulk).....	16.08	8.07	73.64	2.21	4.659
6239	Buckeye Rolled Oats (in package).....	15.97	8.16	73.72	2.15	4.718
6241	Echo White Rolled Oats.....	15.94	8.15	73.74	2.17	4.724
6243	Hecker's Rolled White Oats.....	15.80	8.91	73.24	2.05	4.783
6240	Peoria Rolled Oats.....	15.56	8.33	73.92	2.19	4.662
6246	Quaker Rolled White Oats.....	16.11	9.31	72.44	2.14	4.685
6247	Tip Top Rolled Oats.....	17.75	8.73	71.29	2.23	4.727
<b>WHEAT PREPARATIONS.</b>						
6264	Fruen's Best Wheat Waters.....	10.43	2.34	85.08	2.15	4.354
6263	Fruen's Rolled Wheat.....	10.62	2.26	85.18	1.94	4.307
6254	H-O Company's Breakfast Wheat.....	11.47	1.78	84.70	2.05	4.406
6256	Old Grist Mill Rolled Wheat.....	10.97	2.08	85.13	1.82	4.401
6258	Pettijohn's Breakfast Food.....	13.31	2.05	82.79	1.85	4.401
6249	Cream of Wheat.....	13.14	1.13	85.31	.42	4.372
6251	Farinose.....	15.59	3.32	79.50	1.59	4.479
6252	Fould's Wheat Germ Meal.....	12.24	2.61	83.61	1.54	4.325
6268	Germea.....	14.61	2.70	81.18	1.51	4.473
6250	Hecker's Farina.....	11.86	1.06	86.58	.50	4.378
6257	Old Plymouth Breakfast Food.....	14.75	2.47	81.55	1.23	4.458
6259	Pillsbury's Vitos.....	13.10	1.70	84.48	.72	4.410
6260	Ralston Health Club Breakfast Food.....	12.16	1.56	85.36	.92	4.379
6261	Wheatena.....	16.42	3.79	77.89	1.90	4.541
6262	Wheatlet.....	15.33	2.17	81.23	1.27	4.436
6265	Shredded Whole Wheat Biscuit.....	11.92	1.64	84.78	1.66	4.396
<b>GLUTEN PREPARATIONS.</b>						
6248	Cooked Gluten.....	16.88	3.86	76.80	2.46	4.555
6253	Dr. Johnson's Glutine.....	15.31	.99	82.53	1.17	4.455
6269	Whole Wheat Gluten.....	17.89	5.20	73.85	3.06	4.628
<b>MISCELLANEOUS PREPARATIONS.</b>						
6266	Cook's Flaked Rice.....	8.89	.16	90.52	.43	4.295
6229	Glen Mills Standard Crushed Barley.....	11.14	.96	86.76	1.14	4.326
6267	Grape Nuts.....	12.34	1.14	84.11	2.41	4.357
6286	Malt Breakfast Food.....	14.54	2.43	81.53	1.50	



WEIGHTS OF NUTRIENTS, AND FUEL VALUE OF ONE POUND OF  
CEREAL FOODS AS FOUND IN THE MARKET.

Laboratory number.	Name of Food.	Water.	Protein.	Fat.	Carbo- hydrates.	Ash.	Fuel value per pound.
CORN PREPARATIONS.		Lb.	Lb.	Lb.	Lb.	Lb.	Calo.
6230	Crown Flakes . . . . .	.120	.081	.009	.787	.004	1740
6231	Hecker's Hominy . . . . .	.110	.086	.006	.794	.004	1730
6232	H-O Company's New Process Hominy . . . . .	.120	.080	.005	.792	.003	1725
6233	Mazama . . . . .	.107	.086	.010	.792	.005	1770
UNCOOKED OAT MEALS.							
6234	A Oat Meal . . . . .	.067	.175	.077	.655	.026	2025
6235	C Oat Meal . . . . .	.079	.143	.074	.686	.019	1975
6245	McCann's Finest Oat Meal . . . . .	.051	.125	.101	.705	.019	2055
COOKED OAT PREPARATIONS.							
6242	Hecker's Oat Meal . . . . .	.091	.189	.074	.627	.019	1990
6244	Hornby's H-O Oat Meal . . . . .	.093	.134	.080	.674	.019	1945
6236	American Cereal Company's Rolled Oats . . . . .	.077	.139	.076	.687	.021	1975
6237	American Cereal Company's Rolled Oats . . . . .	.069	.153	.076	.683	.020	1970
6238	Buckeye Rolled Oats (in bulk) . . . . .	.074	.149	.075	.682	.021	1935
6239	Buckeye Rolled Oats (in package) . . . . .	.080	.147	.075	.678	.020	1970
6241	Echo White Rolled Oats . . . . .	.082	.146	.075	.677	.020	1965
6243	Hecker's Rolled White Oats . . . . .	.086	.144	.081	.669	.019	1980
6240	Peoria Rolled Oats . . . . .	.068	.145	.078	.689	.020	1970
6246	Quaker Rolled White Oats . . . . .	.081	.148	.086	.666	.020	1955
6247	Tip Top Rolled Oats . . . . .	.091	.161	.079	.648	.020	1950
WHEAT PREPARATIONS.							
6264	Fruen's Best Wheat Wafers . . . . .	.113	.093	.021	.754	.019	1750
6263	Fruen's Rolled Wheat . . . . .	.106	.095	.020	.761	.017	1745
6254	H-O Company's Breakfast Wheat . . . . .	.117	.101	.016	.748	.018	1765
6256	Old Grist Mill Rolled Wheat . . . . .	.112	.096	.019	.756	.016	1775
6258	Pettijohn's Breakfast Food . . . . .	.107	.119	.018	.739	.017	1780
6249	Cream of Wheat . . . . .	.106	.118	.010	.763	.004	1775
6251	Farinose . . . . .	.094	.141	.030	.720	.014	1840
6252	Fould's Wheat Germ Meal . . . . .	.111	.109	.023	.743	.014	1745
6268	Germea . . . . .	.115	.129	.024	.719	.013	1795
6250	Hecker Farina . . . . .	.114	.105	.009	.767	.004	1760
6257	Old Plymouth Breakfast Food . . . . .	.123	.129	.022	.716	.011	1775
6259	Pillsbury's Vitos . . . . .	.093	.119	.015	.766	.007	1815
6260	Ralston Health Club Breakfast Food . . . . .	.121	.107	.014	.751	.008	1745
6261	Wheatena . . . . .	.086	.150	.035	.712	.017	1885
6262	Wheatlet . . . . .	.116	.136	.019	.718	.011	1780
6265	Shredded Whole Wheat Biscuit . . . . .	.108	.106	.015	.756	.015	1780
GLUTEN PREPARATIONS.							
6248	Cooked Gluten . . . . .	.089	.154	.035	.699	.022	1880
6253	Dr. Johnson's Glutine . . . . .	.102	.138	.009	.741	.011	1815
6269	Whole Wheat Gluten . . . . .	.112	.159	.046	.656	.027	1865
MISCELLANEOUS PREPARATIONS.							
6266	Cook's Flaked Rice . . . . .	.114	.079	.001	.802	.004	1725
6229	Glen Mills Standard Crushed Barley . . . . .	.103	.100	.009	.779	.010	1760
6267	Grape Nuts . . . . .	.053	.117	.011	.797	.023	1870
6286	Malt Breakfast Food . . . . .	.080	.134	.022	.750	.014	

## DISCUSSION.

*Corn Preparations.*

The first four materials in the table are corn products. They differ comparatively little from corn meal in composition, containing, however, somewhat less fat. The average of 19 samples of granular corn meal as compiled in Bulletin 28 of the Office of Experiment Stations shows that one pound contains .125 pounds of water; .092 pounds of protein; .019 pounds of fat; .754 pounds of carbohydrates and .010 pounds of ash. The only claim that the manufacturers make concerning Crown Flakes, Hecker's Hominy and H-O Company's Hominy is that they are carefully prepared from the best quality of corn and are thoroughly kiln dried, so as to keep well. The low percentage of fat indicates that all of these goods were made from corn from which the germ was more or less removed. The Mazama people make an unwarranted claim on the package. They say, a package "provides, when cooked and ready for the table, 23 pounds of unsurpassed food, sufficient to sustain in health and vigor a family of seven for twenty-four hours." Assuming that the family of seven consists of a man, his wife and five children from two to ten years of age, they would require for their nourishment for one day  $1\frac{1}{3}$  pounds protein and enough fats and carbohydrates to furnish altogether 17,000 calories. A package of Mazama carries a little more than .2 of a pound of protein and has a fuel value of little less than 4,500 calories.

*Uncooked Oat Meals.*

The "A" and "C" oatmeals were sold in bulk, being put up in barrels. They differ in composition no more than is to be expected. The "A" oatmeal contains three per cent more protein than the "C." The McCann's oatmeal was put up in a five pound tin can and according to the label was made by John McCann, Drogheda, Ireland. The package carried an analysis by the city analyst of Dublin which differs only slightly from that of the sample here reported. The protein in this meal is considerably less than in American goods. Its high cost is accounted for by the tin package and its being imported goods.

It would be difficult to see why anyone should prefer it to American goods.

#### *Cooked Oat Preparations.*

Hecker's partly cooked oatmeal (No. 6242) and Hecker's rolled white oats (No. 6243) differ in price and, so far as these two samples are concerned, in composition. The former carries a third more protein than the latter. Very few oatmeals contain so high a percentage of protein as sample No. 6242. Hornby's H-O (No. 6244) carries about the average percentage of protein, although on this package there is an analysis which claims 17.63 per cent instead of 13.40 per cent which the sample examined has. The same analysis calls all of the ash phosphates, ("brain and nerves"), which is of course not strictly in accord with fact. The American Cereal Company put their goods up under at least three names and in four forms. Quaker oats are sold only in package, Buckeye oats in package and barrel, and American Cereal Company's oats in bulk. The only apparent difference in the four kinds is the price. The Buckeye oats in bulk retailed in Bangor at 3 1-8 cents per pound, the American Cereal Company's rolled oats in bulk at 4 cents. The Buckeye oats in package cost in Bangor 5.3 cents, and the Quaker oats 6.9 cents a pound. They are all good quality rolled oats, and there seems to be no reason why one should pay 6.9 cents a pound when apparently just as good goods, made by the same company, sell for less than half that price. All of the rolled oats are good goods from the chemical standpoint, and there are no greater differences in composition than one would expect. The goods of different companies differ no more than different samples from the same companies probably would.

#### *Wheat Preparations.*

Judging from the protein content of the different wheat preparations it would appear that they are nearly all made from the soft starch wheats. This is an excellent way to utilize wheat relatively low in gluten, which will, in consequence, not make strong flour. For bread flours no wheats are so good as the hard wheats of high gluten content. For one restricted to a diet of wheat products, the hard wheats are more desirable, but

in a mixed diet there are other sources of protein, and the use of the softer wheats in mushes and the like is to be encouraged.

Fruen's Wheat Wafers at 6.9 cents a pound and Fruen's Rolled Wheat at 4 cents are apparently the same goods, one put up in paper, the other in barrels. The claims that these preparations are "the most natural food for mankind," "the great nerve, brain and muscle food," etc., are exaggerations, but we are so used to overstatement of facts in advertisements that probably no one is deceived by such claims.

The H-O Company's Breakfast Food claims to be made from California wheat, and the analysis, showing 10 per cent protein and 75 per cent of starch, indicates a soft wheat such as is grown in California.

Old Grist Mill Rolled Wheat is also made "from the finest California white wheat." Pettijohn's Breakfast Food "is made from selected Pacific coast wheat." The sample analyzed carries 2 per cent more protein than most of the above mentioned brands.

Cream of Wheat claims to be "composed almost entirely of pure gluten, is one of the healthiest and most nutritious foods known." It claims also to be "made from the very choicest of selected hard spring wheat and being almost pure gluten, is highly recommended for the use of diabetic persons." The claim that Cream of Wheat is "almost pure gluten" is false and should be criminal. As a food for people in health, Cream of Wheat is all right. Diabetic persons should avoid starch and sugar, and this preparation contains 75 per cent of these carbohydrates.

Farinose, "a pure preparation from Ohio's best amber wheat," is the richest in protein of any of the samples examined and in this respect more nearly resembles the oatmeals.

Fould's Wheat Germ Meal "is made from the glutinous portion of choice wheat." If this statement means (and it is evident that it was intended to convey this meaning) that in its manufacture the starchy part of the wheat is excluded, it is not true. Although made by a patented process, the resulting preparation chemically resembles ordinary white wheat preparations in starch and in protein content.

Germea is "prepared from the choicest California white wheat" by the Sperry Flour Company of San Francisco. The

sample examined differs from the average of California wheat products by containing a higher percentage of protein.

Hecker's Farina, judging from appearance and composition, is a finely ground white wheat flour. The only drawback to the goods for the purposes mentioned on the wrapper is the high cost, 14 cents a pound.

The statement that "Old Plymouth Breakfast Food is made from carefully selected *glutinous* wheat" accords fairly well with its analysis which shows it to contain more protein than the most of the other wheat preparations examined. That it "is the most economical of all cereal foods" is not so evident. It costs at retail at the rate of 8 cents per pound, and equally good wheat preparations are sold in bulk at one-half the price.

Pillsbury's Vitos is the "choicest product of carefully selected Northwestern hard spring wheat." The analysis on the package calls for 16.64 per cent of protein, and the sample examined carries only 11.9 per cent. The first analysis corresponds with a hard wheat, while the sample reported bears evidence of having been made from a soft winter wheat. The claimed analysis shows 6.68 per cent of water; the sample examined carried 9.30 per cent.

Ralston Breakfast Food, "a perfect food made from selected wheat rich in gluten," is also apparently made from a soft winter wheat. The sample examined carries 10.70 per cent of protein, and hence could not have been made from a "wheat rich in gluten." It is a well made preparation, but its cost of 8 cents a pound is too high.

The Health Food Company's Wheatena contains the highest percentage of protein of any of the wheat preparations examined by the Station. While some of the claims made by the company for Wheatena are not fully borne out, they do call attention to the fact that it can be used, "in all cases and conditions and by all beings, *except such as suffer from the disease known as diabetes.*" Its high cost, 11.4 cents per pound, prevents its use as an economical cereal food.

"Wheatlet," made from choice selected wheat "especially rich in the nitrogenous elements," is a well prepared food of good composition, carrying a higher per cent of protein (13.6%) than most of the wheat preparations.

There is probably no other cereal food on the market so widely and extensively advertised as Shredded Wheat Biscuit. For the most part its advertising matter is free from exaggerated statements. Its chemical composition is that of good quality winter wheat. It is the highest in price of any of the wheat preparations, costing nearly 15 cents a pound. From this fact it should not have a place upon the table of those who are trying to live economically.

The average composition of the different classes of corn, oat and wheat preparations is compared with milk and a good quality of bread flour in the following table.

WEIGHT OF NUTRIENTS AND FUEL VALUE OF ONE POUND OF THE MORE IMPORTANT CLASSES OF CEREAL FOODS AS FOUND IN THE MARKET COMPARED WITH MILK AND FLOUR.

Classes of Foods.	Water.	Protein.	Fat.	Carbohy- drates.	Ash.	Fuel value per pound.
	Pound.	Pound.	Pound.	Pound.	Pound.	Calories.
Milk .....	.865	.035	.042	.051	.007	337
Flour .....	.128	.131	.013	.723	.005	1645
Corn foods .....	.114	.084	.007	.791	.004	1740
Oat meals .....	.060	.148	.084	.682	.021	2018
Rolled oats.. .....	.081	.150	.078	.671	.020	1965
Wheat meals.....	.108	.124	.020	.737	.010	1790
Rolled wheats .....	.111	.101	.019	.752	.017	1765

#### *Miscellaneous Preparations.*

Cook's Flaked Rice is "manufactured from the best Carolina head rice." It has practically the same composition as raw rice, but is cooked ready for use. Rice is much lower in protein content than wheat or oats, and more nearly resembles Indian corn in composition. Best Carolina head rice retails for 10 cents a pound. The price asked for the cooked flaked rice in packages makes its cost about 15 cents per pound.

Glen Mills Crushed Barley has about the same composition as bolted barley meal. Its cost, 7½ cents a pound, is about that of the wheat preparations in packages.

Malt Breakfast Food is prepared "from the best barley malt and the choicest wheat." It contains as much protein as the best of the wheat foods. The analysis here reported agrees as closely as would be expected with that on the package.

Grape Nuts, manufactured by the Postum Cereal Company, is "made by special treatment of entire wheat and barley." These goods have nearly the same proximate composition as the wheat foods. Part of the starch has been changed into dextrin and grape sugar. The claims of the makers are preposterous. Grape Nuts "are a condensed food." "Four heaping teaspoons of Grape Nuts are sufficient for the average meal." "The system will absorb a greater amount of nourishment from 1 pound of Grape Nuts than from ten pounds of meat, wheat, oats, or bread." A man at moderate work needs per day about .28 pounds of protein and sufficient fats and carbohydrates in addition to make the potential energy of the day's food 3,500 calories. Four heaping teaspoonfuls of Grape Nuts weigh about 1 ounce. The protein and energy needed for one meal ( $\frac{1}{3}$  of 1 day) and that furnished by 4 heaping teaspoonfuls of Grape Nuts are compared in the following table:

	Protein —lbs.	Fuel value —calories.
Needed for $\frac{1}{3}$ day by man at moderate work..	.090	1,175
Furnished by four heaping teaspoonfuls, (1 oz.) of Grape Nuts.....	.007	117

It would require .77 pounds of Grape Nuts ( $\frac{3}{4}$  of a package) to furnish  $\frac{1}{3}$  of the protein needed for one day for a man at moderate work; the energy needed would be afforded by .63 pounds.

The nutrients of beef are more completely digested and absorbed than those of vegetable foods. There is no reason for thinking that Grape Nuts would be more completely digested than rolled oats, wheat flour or wheat bread. About 85 per cent of the protein and of fuel value of vegetable foods are digested and rendered available to the body. In the following table there are compared the pounds of protein and fuel values of one pound of Grape Nuts with "ten pounds of meat, wheat, oats or bread."

POUNDS OF PROTEIN AND FUEL VALUE OF ONE POUND OF GRAPE NUTS COMPARED WITH 10 POUNDS OF BEEF, ROLLED WHEAT, WHEAT FLOUR, ROLLED OATS AND BREAD.

	Protein -lbs.	Fuel value - calories.
1 pound of Grape Nuts.....	.12	1,870
10 pounds round steak, including bone.....	1.90	8,950
10 pounds beef rump, including bone.....	1.29	14,050
10 pounds rolled wheat.....	1.01	17,650
10 pounds bread flour.....	1.31	16,450
10 pounds rolled oats.....	1.50	19,650
10 pounds white bread.....	.80	12,200

While there is no question that Grape Nuts is a good cereal food, it is difficult to understand why the manufacturers should make claims so absurd and contrary to fact.

#### *Gluten Preparations.*

It was the intention to confine this study to the breakfast cereals, but as local physicians were prescribing certain so-called gluten foods for diabetic patients, the three in most common use were analyzed. Gluten preparations, containing as high as 70 per cent of protein, were on the market five years ago, and there are now preparations carrying from 30 to 50 per cent of gluten which can be used with reasonable safety by persons suffering from diabetes. As is seen from the table, the Health Food Company's Cooked Gluten, Dr. Johnson's Glutine, and the Health Food Company's Whole Wheat Gluten carry only a little more protein and a little less carbohydrates than ordinary flour. Samples of flour made from the hard spring wheat of the Northwest not infrequently carry more protein than the sample of Dr. Johnson's Glutine and nearly as much as the two other samples here reported upon. Too much can hardly be said in condemnation of the foisting, by false statements in advertising, such materials upon diabetic patients, imposing upon physicians as well as the public. As articles of food for healthy persons, or for the undernourished, those so-called glutens are excellent, and whole wheat gluten at 11 cents a pound is no more expensive than some breakfast cereals. The two others each cost at retail



about 27 cents a pound. The analyses of these materials compared with ordinary bread flour bought by the Station in the open market are given, calculated on dry matter, in the table which follows:

COMPOSITION OF WATER-FREE-MATERIAL OF ORDINARY BREAD FLOUR AND THREE GLUTEN MATERIALS.

	Protein.	Fat.	Carbohydrates.	Ash.	Fuel value.
	%	%	%	%	%
Bread Flour . . . . .	15.02	1.50	82.91	.57	-
Cooked Gluten* . . . . .	16.88	3.86	76.80	2.46	4555
Whole Wheat Gluten*. . . . .	17.89	5.20	73.85	3.06	4628
Dr. Johnson's Glutine . . . . .	15.31	.99	82.53	1.17	4455

\* Made by the Health Food Company.

While the composition of foods would seem to be a matter of prime importance, to the average consumer the cost is a matter of equal importance. An intelligent selection can be made only by considering both factors. In the following table there is shown the amount of the various constituents that can be purchased for 10 cents at the prices mentioned, milk at 5 cents per quart and flour at 3 cents per pound being added for comparison.

A study of the table shows that protein is furnished more cheaply by oat preparations than by those of corn or wheat. The oats also supply fat 10 times as cheaply as the corn products, and 5 times as cheaply as the wheat foods. The carbohydrates are supplied most economically by the corn preparations, oats ranking second. In fuel value, oats again rank first.

If wheat flour be included in the comparison, it will be found to be the cheapest source of protein and carbohydrates. With the exception of one sample of rolled oats, it also leads in fuel value.

AMOUNTS OF NUTRIENTS FURNISHED FOR TEN CENTS IN CEREAL FOODS  
AT ORDINARY PRICES, COMPARED WITH MILK AND FLOUR.

Name of Food.	TEN CENTS WILL PAY FOR—						
	Prices per pound.	Total food materials.	Nutrients.				Fuel value.
			Total.	Protein.	Fats.	Carbo- hydrates.	
	Cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Calo.
Milk.....	2.5	4.00	.51	.14	.17	.20	1350
Flour.....	3.0	3.33	2.88	.43	.04	2.41	5471
Crown Flakes.....	5.7	1.75	1.54	.14	.02	1.38	3047
Hecker's Hominy.....	4.1	2.44	2.16	.21	.01	1.94	4221
H-Company's New Process Hominy.....	4.5	2.22	1.95	.18	.01	1.76	3832
Mazama.....	6.0	1.67	1.48	.14	.02	1.32	2956
A Oat Meal.....	4.0	2.50	2.27	.44	.19	1.64	5065
C Oat Meal.....	4.0	2.50	2.26	.36	.19	1.71	4940
McCann's Finest Oat Meal.....	10.7	.93	.86	.12	.09	.65	1910
Hecker's Oat Meal.....	7.1	1.41	1.25	.27	.10	.88	2807
Hornby's H-O Oat Meal.....	7.3	1.37	1.21	.18	.11	.92	2667
Rolled Oats, American Cereal Company's.....	4.0	2.50	2.26	.35	.19	1.72	4935
Rolled Oats, American Cereal Company's.....	4.0	2.50	2.28	.38	.19	1.71	4920
Buckeye Rolled Oats (in bulk).....	3.1	3.23	2.92	.48	.24	2.20	6318
Buckeye Rolled Oats (in package).....	5.3	1.89	1.70	.28	.14	1.28	3720
Echo White Rolled Oats.....	5.1	1.96	1.77	.29	.15	1.33	3855
Hecker's Rolled White Oats.....	5.2	1.92	1.72	.28	.16	1.28	3805
Peoria Rolled Oats.....	4.0	2.50	2.27	.36	.19	1.72	4928
Quaker Rolled White Oats.....	6.9	1.45	1.30	.21	.12	.97	2832
Tip Top Rolled Oats.....	4.1	2.44	2.16	.39	.19	1.58	4753
Fruen's Best Wheat Wafers.....	6.9	1.45	1.25	.13	.03	1.09	2539
Fruen's Rolled Wheat.....	4.0	2.50	2.19	.24	.05	1.90	4365
H-O Company's Breakfast Wheat.....	7.9	1.27	1.10	.13	.02	.95	2243
Old Grist Mill Rolled Wheat.....	7.1	1.41	1.23	.14	.03	1.06	2501
Pettijohn's Breakfast Food.....	7.0	1.43	1.26	.17	.03	1.06	2548
Cream of Wheat.....	9.0	1.11	.99	.13	.01	.85	1968
Farinose.....	7.3	1.37	1.22	.19	.04	.99	2522
Fould's Wheat Germ Meal.....	4.9	2.04	1.79	.22	.05	1.52	3558
Germea.....	8.6	1.16	1.01	.15	.03	.83	2083
Hecker's Farina.....	14.0	.71	.62	.07	.01	.54	1249
Old Plymouth Breakfast Food.....	8.0	1.25	1.08	.16	.03	.89	2219
Pillsbury's Vitos.....	6.2	1.61	1.44	.19	.02	1.23	2919
Ralston Health Club Breakfast Food.....	8.0	1.25	1.09	.13	.02	.94	2183
Wheatena.....	11.4	.88	.79	.13	.03	.63	1656
Wheatlet.....	6.9	1.45	1.27	.20	.03	1.04	2580
Shredded Whole Wheat Biscuit.....	14.8	.68	.59	.07	.01	.51	1210
Cooked Gluten.....	27.3	.37	.33	.06	.01	.26	696
Dr. Johnson's Glutine.....	27.7	.36	.32	.05	.00	.27	653
Whole Wheat Gluten.....	11.0	.91	.78	.14	.04	.60	1696
Cook's Flaked Rice.....	17.6	.57	.50	.04	.00	.46	984
Glen Mills Standard Crushed Barley.....	7.5	1.33	1.18	.13	.01	1.04	2342
Grape Nuts.....	15.9	.63	.58	.07	.01	.50	1179
Malt Breakfast Food.....	10.1	.99	.89	.13	.02	.74	